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APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/996,788	11/30/2001	Naokatsu Ikegami	OKI.286	4551

7590 06/16/2004

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EXAMINER	
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ART UNIT	PAPER NUMBER
1765	

DATE MAILED: 06/16/2004

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 052004

Application Number: 09/996,788
Filing Date: November 30, 2001
Appellant(s): IKEGAMI, NAOKATSU

Andrew J. Telesz
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed February 17, 2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

The appellant's statement in the brief that certain claims do not stand or fall together is not agreed with because merely pointing out differences in what the claims cover (reiteration of claim recitation) is not an argument as to why the claims are separately patentable. Therefore, the rejection of claims 10, 11, 13, 15 and 12, 14 stand or fall together because appellant's brief does not include reasons in support statement that this grouping of claims does not stand or fall together. See 37 CFR 1.192(c)(7).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,356,515	TAHARA et al.	10-1994
5,827,778	YAMADA	10-1998
5,843,847	PU et al.	12-1998

6,174,796 TAKAGI et al. 1-2001

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tahara et al. (US 5,356,515; hereinafter "Tahara") in view of Yamada (US 5,827,778) and Pu et al. (US 5,843,847; hereinafter "Pu").

Tahara teaches a method for manufacturing a semiconductor device having conductive path extending from an upper surface of an insulating layer of silicon dioxide on a semiconductor substrate to a conductive member embedded in the insulating layer. An etching mask may be formed on the insulating layer to define an etched hole for the conductive path. A hole may be etched in the insulating layer to the conductive member using the etching mask and a reactive gas of CHF_3 / CO components (col. 12, lines 52-65; col. 17, lines 1-27).

Tahara teaches the effect of etching selectivity of CO addition to CHF_3 with various flow ratios (col. 16, lines 52-67). Tahara also shows various process conditions and states that the etching method can be performed under various conditions in addition to the conditions employed in the embodiments (col. 17, 13-30). Tahara does not disclose that a flow ratio about 15/85. In a method of silicon oxide etching, Yamada teaches the effect of etching rate as function of flow ratio of CHF_3 / CO including a flow ratio about 15/85 (see Fig. 6). Hence, it would have been obvious to one with ordinary skill in the art to use a suitable flow rate of CHF_3 / CO as disclosed by Yamada in order to have a desired etching rate.

Instant claims differ from the prior art by specifying the misalignment of the etching mask and the offset portion extending beyond the conductive member. However, since the etching mask and the desired location of the hole are never perfectly lined up with each other, it appears that **an etched groove** is always exist in the etching process and include an offset portion. Yamada is relied on to show this conventional feature, see Figs.1B, 1C and col. 1, lines 40-48 of Yamada. Therefore, it would have been obvious to one with ordinary skill in the art to have said conventional feature of Yamada in Tahara because it is a conventional feature and it is disclosed in Yamada.

The use of conventional features to perform their known functions in a conventional process is obvious. In re Raner 134 USPQ 343.

Furthermore, It is well known that the etching process of using carbon-containing etchant gas produces polymeric byproducts as a passivating layer, which deposit on the sidewalls and the bottom. In a method for etching dielectric layers, Pu teaches using carbon-containing etchant gas (significantly, Pu cites CHF_3 / CO as an example which is the same etchant used the claimed invention) produces polymeric products as a passivating layer which could limit the etching (col.1, lines 64-col.2, line 4). Hence, it would have been obvious to one with ordinary skilled in the art to use the polymeric product generated during the etching to stop a downward extension of the etching of the misalignment groove in the process of modified Tahara and Yamada because Pu teaches the polymeric product generated during the etching may be used as a passivating layer which could **limit the etching**.

Tahara teaches selective etching process for forming a contact hole for the conductive path. Instant claims differ from Tahara by specifying filling the hole with a conductive material for the conductive path. However, it is a conventional process step for manufacturing a semiconductor device, and Yamada teaches same (col. 1, lines 31). Hence, it would have been obvious to one with ordinary skill in the art to fill the hole formed by the etching process with a conductive material in order to complete the interconnect structure in semiconductor device fabrication.

The combined prior art does not specify the size of the offset portion of etching mask required in their process and product. Dependent claims 12 and 14 differ from combined prior art by specifying sizes of offset portion of etching mask. However, it is merely depending on the specific product requirement. Hence, it would have been obvious to one with ordinary skill in the art to determine it based on the specific product design and requirement.

The above-cited claims differ from the combined prior art by specifying various processing parameters (such as 1600 W of frequency power in claim 12; the flow rates in claims 13-15). However, Tahara shows various process conditions and states that the etching method can be performed under various conditions in addition to the conditions employed in the embodiments (col. 17, 13-30). The power of the etching system and the flow rate of the etchant gas are commonly determined by routine experiment. The process of conducting routine optimizations so as to produce an expected result is obvious to one of ordinary skill in the art. Hence, a person having ordinary skill in the art would have found it obvious to modify Tahara, Yamada and Pu by performing routine

experiments (different processing parameters) in order to obtain optimal result. It is noted that applicant did not traverse the aforementioned conventionality (e.g., well-known features, obviousness), which have been stated in the office action in Paper No.3.

(11) Response to Argument

Appellant has argued that Tahara et al. reference does not disclose misalignment of etching mask. It is not persuasive. As has been stated in the office action, since the etching mask and the desired location of the hole are never perfectly lined up with each other, it appears that an etched groove is always exist in the etching process. Yamada is relied on to show this conventional feature, see Figs.1B, 1C and col. 1, lines 40-48. It is a notoriously well-known scenario in the art of semiconductor device fabrication.

Appellant has argued that Tahara et al. reference does not disclose the need or use of a polymeric product as an etch stop. It is not persuasive. As in the office action, Tahara et al. reference teaches that a hole may be etched in the insulating layer to the conductive member using the etching mask and a reactive gas of CHF_3 / CO components (col. 12, lines 52-65; col. 17, lines 1-27). It is well known that the etching process of using carbon-containing etchant gas (such as CHF_3 / CO) produces polymeric byproducts forming a passivating layer, which deposits on the sidewalls and the bottom. The examiner cited that Pu discloses that it is conventional to use carbon-containing etchant gas (such as CHF_3 / CO as instantly claimed) to produce polymeric

products as a passivating layer which could **limit the etching** (col.1, lines 64-col.2, line 4). Applicant has not commented on or acknowledged same.

Appellant has argued that Yamada does not disclose using a polymeric product formed during etching as an etch stop and Pu has different object for the invention. It is not persuasive. Yamada and Pu are relied on to show the well-known (conventional) features (e.g., an etched groove is always exist in the etching process, and carbon-containing etchant gas (such as CHF_3 / CO) producing polymeric products as a passivating layer which could **limit the etching).** Furthermore, The combined prior art (Tahara, Yamada, and Pu) teaches the claimed invention. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. In re Merk &Co., Inc., 800F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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